IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Moungi G. Bawendi et al.
Serial No. : 10/632,922
Filed : August 4, 2003
Title : INVENTORY CONTROL

Art Unit : 1639
Examiner : My Chau T. Tran

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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Applicants request review of the rejections in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the following remarks.

Claims 1-3, 12, 13, 26, 27, 31-33 and 37-39 are pending.

Objection - Improper Markush language

Applicants thank the Examiner for withdrawing the previous objections.

Rejection under 35 U.S.C. § 102(b)

The Examiner has maintained the rejection of claims 1-3, 12, 13, 26, 27, 31-33 and 37-39 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,674,698 to Zarling et al. ("Zarling"). See Office Action at pages 4-8. Claims 1, 26 and 37 are independent claims.

Applicants have discovered a library of compounds, wherein each compound in the library is bound to an individual support, a chemical library that includes a plurality of member chemicals, wherein each member chemical is bound to a support, and a library of polypeptides that includes a plurality of polypeptides, wherein each polypeptide in the library is bound to an individual support. Each support has associated therewith more than one population of semiconductor nanocrystals. Each population has a distinct characteristic spectral emission. Each nanocrystal includes a Group II-VI semiconductor, a Group III-V semiconductor, a Group IV semiconductor, or an alloy thereof, or a mixture thereof. See claims 1, 26, and 37.

The Examiner maintains the position that Zarling discloses an up-converting phosphor particle that includes "an absorber (refers to the instant claimed [] shell layer overcoating the core) and the emitting center (refers to instant claimed core) such that the combination of

absorber and emitter produces emission spectra (refers to instant claimed functional property of the nanocrystal ...." See Office Action at page 6.

Zarling discloses "labels, detection methods and detection apparatus which permit ultrasensitive detection of cells, biological macromolecules, and other analytes, which can be used for multiple target detection and target discrimination." See col. 5, lines 23-26. Specifically, Zarling discloses the use of "fluorescent labels that are excited by an excitation wavelength and subsequently emit electro magnetic radiation at up-shifted frequencies." See col. 12, lines 56-59. The emitting center and the absorber described in Zarling is not a semiconductor nanocrystal core overcoated by a semiconductor shell. See col. 14, lines 15-50. Zarling does not describe a nanocrystal that includes a Group II-VI semiconductor, a Group III-V semiconductor, a Group IV semiconductor, or an alloy or mixture thereof. See independent claims 1, 26 and 37.

1. Group II-VI, Group III-V and Group IV Semiconductors In the Advisory Action mailed November 15, 2006, the Examiner contends that "the scope of the claimed 'nanocrystal' would encompass any 'semiconductor' members of group II thru group VI (group II-VI) of the chemical periodic table." See page 3. The Examiner then goes on to reference the specification. See page 3. As argued previously, the Examiner does not appear to recognize the simple language of the claims.

The phrase "Group III-V semiconductor," refers to a binary semiconductor including Group III element and a Group V element. It does not set forth a range; it does not indicate that the semiconductor can include an element from any of Groups III, IV, or V. For example, the specification lists some examples of Group III-V semiconductors at page 10, lines 1-3: "GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, AlAs, AlP, AlSb." Each example in the list includes a group III element (Ga, In, Al) and a group V element (N, P, As, Sb) but no others. Ytterbium and Erbium are not Group III-V semiconductors. Nor are any of the other materials described as the absorber and the emitting center (see, e.g., Zarling at column 16, Table 1). Indeed, none of the materials described as the absorber and the emitting center are a Group II-VI semiconductor, a Group II-VI semiconductor, a Group III-V semiconductor, a Group IV semiconductor, an alloy thereof, or a mixture thereof.

For at least this reason, independent claims 1, 26 and 37 and the claims that depend from them are patentable over Zarling. Applicants respectfully ask that the Examiner reconsider and withdraw the rejection on this basis.

2. Core/Shell Claims 2, 31 and 38 each recite a nanocrystal that includes **a core including a first semiconductor material and a shell layer overcoating the core**, the shell including a second semiconductor material having a band gap greater than that of the core.

In the Advisory Action, the Examiner argues that in Zarling "the center (core) has a shell layer (host materials)." See page 4. As presented many times before, the nanocrystals claimed in claims 2, 31 and 38 have a core and a shell layer. Nothing in Zarling is a nanocrystal or is a nanocrystal including a core and a shell layer overcoating the core.

The emitting center and the absorber described in Zarling, whether viewed separately or together, are not a semiconductor nanocrystal core. As the specification describes, a semiconductor nanocrystal core is itself a semiconductor nanocrystal. At pages 16-17, the relationship between a semiconductor nanocrystal core and its overcoating are described, noting that "the surface of the semiconductor nanocrystal [i.e., the core] is also modified . . . by adding an overcoating layer [i.e., the shell layer] to the semiconductor nanocrystal. . . . Suitable materials for the overcoating layer include semiconductors having a band gap energy higher than the semiconductor nanocrystal [i.e., the core]." Zarling does not teach that the emitting center and the absorber (alleged to be equivalent to the claimed core) constitute a semiconductor nanocrystal. Zarling simply describes that "[g]enerally, the absorber is ytterbium and the emitting center can be selected from: erbium, holmium, terbium, and thulium; however, other up-converting phosphors of the invention may contain other absorbers and/or emitters." (Zarling at column 14, lines 33-37).

For at least this reason, claims 2, 31 and 38 are patentable over Zarling. Applicants respectfully ask that the Examiner reconsider and withdraw the rejection on this basis.

3. Band Gap Claims 2, 31 and 38 each recite a nanocrystal that includes a core including a first semiconductor material and a shell layer overcoating the core, the shell including a second semiconductor material **having a band gap greater than that of the core**.

Zarling does not teach that the band gap of the shell semiconductor material is greater that of the core. Zarling merely provides a list of exemplary materials for the host material, the absorber, and the emitting center, but does not discuss their band gaps, or teach or suggest that a particular relationship between the band gaps can be desirable.

For at least this reason, claims 2, 31 and 38 are patentable over Zarling. Applicants respectfully ask that the Examiner reconsider and withdraw the rejection on this basis.

As discussed above, independent claims 1, 26 and 37 and the claims that depend from them are not anticipated by Zarling. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(b).

Rejection under 35 U.S.C. § 112, second paragraph

The Examiner has rejected claims 1-3, 12, 13, 26, 27, 31-33, and 37-39 under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically the Examiner contends that independent "claims 1, 26 and 37 recites the broad recitation of 'Group II-VI semiconductor', and the claim also recites 'Group II-VI semiconductor' [sic, III-V semiconductor?] and 'Group IV semiconductor' which is the narrower statement of the range/limitation." See the Office Action at page 9. Applicants respectfully disagree.

As discussed above, the phrase "Group II-VI semiconductor" does not set forth a range. The phrase does not indicate a semiconductor that includes an element of any of Groups II, III, VI, V, or VI. Rather, "Group II-VI semiconductor" refers to a semiconductor that includes both a Group II element and a Group VI element. This terminology is common in the semiconductor arts. The same is true for the phrase "Group III-V semiconductor," which refers to a semiconductor including both a Group III element and a Group V element, and not to a semiconductor including elements from any of Groups III, IV, or V.

The specification is consistent with this usage of "II-VI" and "III-V." At page 9, line 28-page 10 line 3, exemplary semiconductor materials are discussed:

> The core and/or the shell can be a semiconductor material including, but not limited to, those of group II-VI (ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgTe, MgTe and the like) and III-V (GaN, GaP, GaAs, InN, InP, InAs, InSb, AlAs, AlP, AlSb, AlS, and the like) and IV (Ge, Si, Pb, and the like) materials, and an alloy thereof, or a mixture thereof.

Each exemplary group II-VI semiconductor material includes a group II element (Zn, Cd, Hg, Mg) and a group VI element (S, Se, Te); each group III-V semiconductor material includes a group III element (Ga, In, Al) and a group V element (N, P, As, Sb); and each group IV semiconductor material includes a group IV element (Ge, Si, Pb). No group III, IV, or V elements appear in the list for group II-VI semiconductor materials and no group IV elements appear in the list of group III-V elements, as would be expected from the ordinary usage of "Group II-VI semiconductor" and "Group III-V semiconductor."

Because a person of ordinary skill in the art would understand that the phrases "Group II-VI semiconductor," and "Group III-V semiconductor," do not set forth ranges but refer to binary semiconductors including elements of Groups II and VI, or Groups III and V, respectively, the claims are not indefinite. Applicants respectfully ask that the Examiner reconsider and withdraw the rejection under 35 U.S.C. § 112, second paragraph.

Rejection under 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-3, 12, 13, 26, 27, 31-33, and 37-39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,770,358 to Dower et al. ("Dower") in view of Zarling. See Office Action at pages 10-13. Claims 1, 26 and 37 are independent claims.

The Examiner admits that Dower does not teach semiconductor nanocrystals at all ("The libraries of Dower et al. differ from the presently claimed invention by failing to include semiconductor nanocrystal labels.") (Office Action at 10). Zarling does not remedy this defect. As discussed above, Zarling fails to teach all the limitations of independent claims 1, 26 and 37, and the claims that depend from them. Specifically, Zarling does not teach a nanocrystal that includes a Group II-VI semiconductor, a Group III-V semiconductor, a Group IV semiconductor, or an alloy thereof, or a mixture thereof. Nor does Zarling teach a nanocrystal that includes a core including a first semiconductor material and a shell layer overcoating the core, the shell including a second semiconductor material having a band gap greater than that of the core.

Because Dower taken in view of Zarling fails to teach all the claimed limitations, Applicants respectfully request reconsideration and withdrawal of this rejection.

CONCLUSION

In light of the foregoing remarks, Applicant respectfully contends that all conditions of patentability are met. Allowance of the claims is therefore respectfully solicited.

The Director is authorized to charge any fees required by the present Request to Deposit Account 19-4293.

Respectfully submitted,

Date: 12-18-06

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